ON SHAKY GROUND

ABAG General Assembly

SUMMARIES OF WORKSHOPS FEBRUARY 11 AND 12, 1976 ABAG GENERAL ASSEMBLY

ABAG ASSOCIATION OF BAY AREA GOVERNMENTS

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ON SHAKY GROUND

Program

ABAG General Assembly

A

Concurrent Workshops on Earthquake Phenomena & Research

A-1. Old Myths & New Theories
Dr. Ian Campbell
Retired State Geologist
Chief, Division of Mines & Geology
San Francisco

Dr. Richard H. Jahns
Dean
School of Earth Sciences
Stanford University
Commissioner, Seismic Safety Commission

A-2. What Have We Learned From Recent Quakes?
Dr. Gordon B. Oakeshott
Geologist
Oakland

A-3. Earthquake Prediction-Intensity
Dr. Roger Borcherdt
Geophysicist
U. S. Geological Survey
Menlo Park

A-4. The Implications of Earthquake Forecasting for Local Governments
Robert A. Olson
Executive Director
California Seismic Safety Commission
Sacramento

Leo Weisbecker
Project Leader
Earthquake Prediction and Technology Assessment
Stanford Research Institute

A-5. The Liabilities of Local Governments
John Flitner
Attorney
Santa Rosa

Dr. Ira Michael Heyman
Vice Chancellor
University of California, Berkeley

A-6. People, Predictions, and Perceptions
Dr. J. Eugene Haas
Program Director
Institute of Behavioral Sciences
University of Colorado

A-7. Earthquake Hazards Evaluation
Dr. Robert Wallace
Chief Scientist
Office of Earthquake Studies
U. S. Geological Survey
Menlo Park

Edward A. Danehy
Engineering Geologist
San Jose

William J. Kockelman
Environmental Planner
San Francisco Bay Study
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Concurrent Workshops on the Components of Earthquake Preparedness

B-1. Earthquake Engineering
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URS/John A. Blume & Associates
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H. J. Degenkolb and Associates
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Commissioner, Seismic Safety Commission

B-2. What Goes Where?
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William Spangle & Associates
Portola Valley
Commissioner, Seismic Safety Commission

Eleanor Young
Senior Planner
Santa Clara County

Charles Zahn
Senior Planner
Contra Costa County

Bruce Allred
Planning Director
Hayward

B-3. Earthquakes & Money: Insurance & Other Sorrows
W. Victor Slevin
Vice President
American Insurance Association
San Francisco

B-4. The Parapet & The Pedestrian (Ordinances & Codes)
Dr. Henry Lagorio
Professor of Architecture
University of California, Berkeley
Division of Environmental Research & Technology
National Science Foundation
Commissioner, Seismic Safety Commission

J. Fred Silva
Consultant
Senate Local Government Committee
Sacramento

B-5. How Utilities Can Survive
Richard Bettinger
Chief Civil Engineer
Pacific Gas and Electric Company
San Francisco

Helen Burke
Director
East Bay Municipal Utility District
Oakland

B-6. The Emergency Response System: A Case of Underkill?
Loren Fields
Planning Officer
California Office of Emergency Services
Sacramento

William W. Ward
Regional Manager
California Office of Emergency Services
Concord

Cecil C. Byrd
Senior Planner
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B-7. The Costs of Getting Ready
Dr. Stanley Scott
Assistant Director
Institute of Governmental Studies
University of California, Berkeley

Frank E. McClure
Structural Engineer
McClure & Messinger
Oakland
Commissioner, Seismic Safety Commission

ON SHAKY GROUND

C

Concurrent Workshops — How Local Governments Can Get Ready

C-1. Film & Discussion
"Our Active Earth"
State of California Office of Emergency Services
Sacramento

Vice Mayor Patrick Griffin
City of Albany

C-2. The Implications of Earthquake Prediction
Professor William Anderson
Sociology Department
Arizona State University

C-3. What Should a Seismic Safety Plan Do?
William Press
Deputy Director
California Office of Planning and Research
Sacramento

C-4. The Status of Earthquake Prediction & Public Warnings
Dr. Peter L. Ward
Chief
Branch of Seismology
U. S. Geological Survey
Menlo Park

C-5. Can Our Emergency Systems Respond?
Charles Manfred
Director
California Office of Emergency Services
Sacramento

C-6. Rebuilding After the Next Quake
Arthur Keene
County of Los Angeles

D

Concurrent Workshops — How Local Governments Can Get Ready

D-1. Getting to First B.A.S.E.
Vince Conners
Regional Field Specialist
Defense Civil Preparedness Agency, Region 7
Santa Rosa

D-2. Local Governments' Liability in Disasters
John Larson
Los Angeles County Counsel

D-3. Who's in Charge After the Quake?
Robert C. Stevens
Regional Director
Federal Disaster Assistance Administration, Region 9
San Francisco

D-4. What Can Local Governments Encourage Property Owners To Do?
Peter Yanev, Author
Peace of Mind in Earthquake Country
URS/John A. Blume & Associates
San Francisco

D-5. What Should a Seismic Safety Plan Do?
Moderator: Councilwoman Joyce A. Jackson
City of Albany

Don Woolfe
Planning Director
San Mateo County

F. Beach Leighton
President
F. Beach Leighton & Associates
La Habra

D-6. Are Present Building Standards Adequate?
Professor Emeritus
George Simonds
University of California, Berkeley

D-7. Aiding the Injured
Dr. Saleem Farag, Chief
Emergency Medical Services
Comprehensive Health Planning
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William Kendall
Earthquake Response Planner
Emergency Medical Services
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Dr. Wayne P. Chesbro, M.D.
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ACTION ON EARTHQUAKE PREPAREDNESS

ASSOCIATION OF BAY AREA GOVERNMENTS

GENERAL ASSEMBLY

FEBRUARY 12, 1976

By a unanimous vote, the General Assembly determined that earthquake preparedness should be a high priority for ABAG, and directed the Executive Board and staff to develop specific programs in earthquake preparedness for the agency. Such programs would be in the areas of public information, legislative advocacy, planning and technical assistance. Possible activities for ABAG to be investigated in the coming months are:

1. Providing technical assistance of an interdisciplinary nature to upgrade and improve local seismic safety programs.

2. Strengthening State guidelines, criteria and procedures for the review of local seismic safety programs.

3. Advocating legislation to fund the improvement and especially implementation of local seismic safety programs.

4. Approaching building design and site planning from an interdisciplinary point of view so that both functional and structural failure concerns are addressed.

5. Seeking State funding to improve disaster response capability especially in the areas of communications, emergency medical services, fire protection (including structural response), utility systems, and relocation facilities. Secondary or back-up systems should be considered.

6. Increasing citizen and governmental awareness of disaster preparedness concerns through continuing information and education programs.

7. Expanding the use of media for public service messages concerning hazard reduction and disaster preparedness.

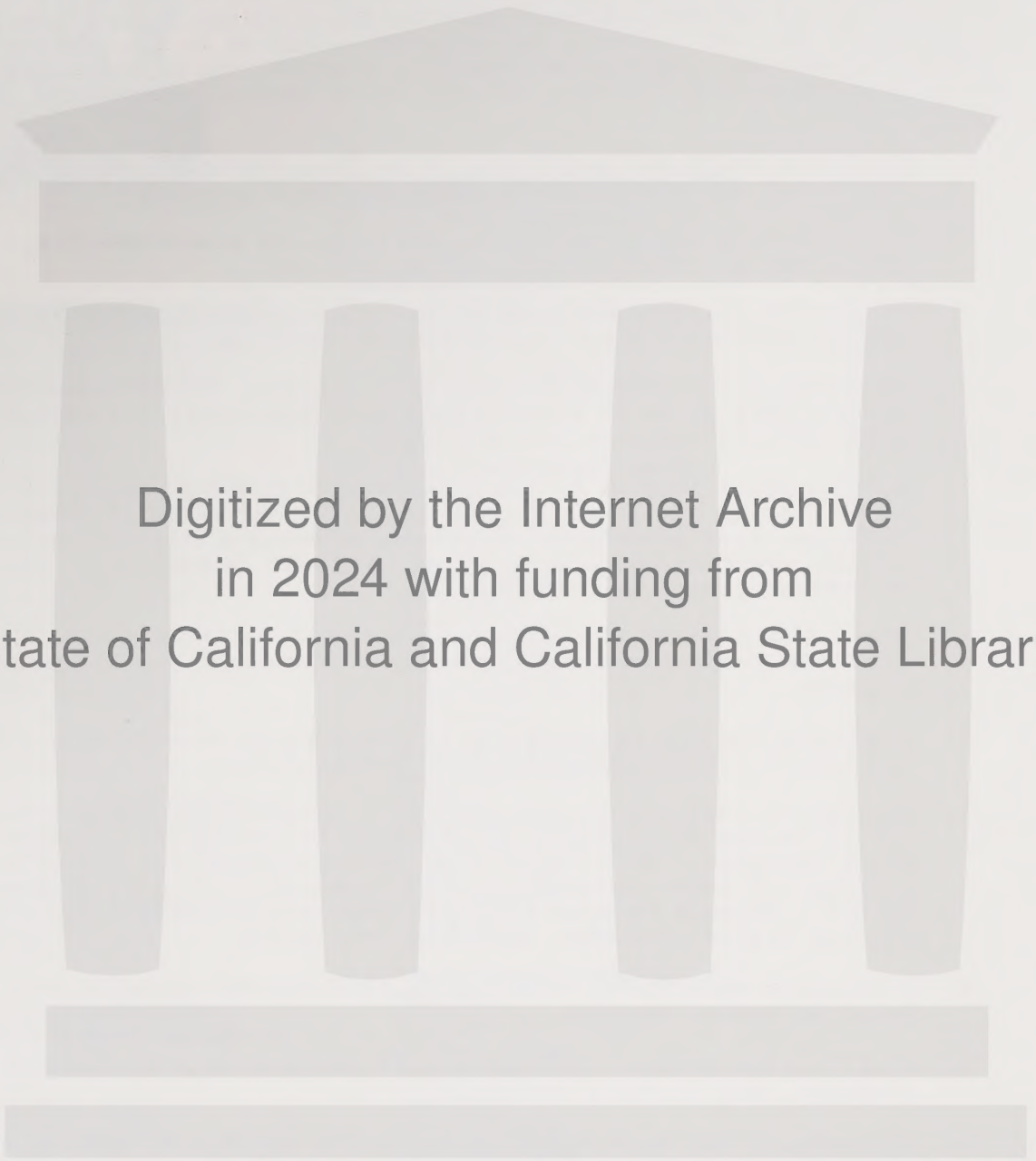
8. Advocating legislation that will help re-establish economic stability in the aftermath of a catastrophic earthquake or other major disaster. Such legislation should address the fiscal solvency of local governments, the financial crisis of property owners. Methods such as federally underwritten earthquake and similar hazard insurance should be considered.

9. Developing methodical, financially feasible and workable programs to reduce hazards.

10. Facilitating greater coordination of earthquake preparedness, response, and recovery programs.

11. Encouraging the development of effective earthquake prediction methods, and developing programs to use predictive information to minimize panic and maximize a safe response to a potential seismic event.

12. Referring to the Legislation and Governmental Organization Committee for possible ABAG endorsement of the earthquake legislation (S. 1174) proposed by U. S. Senator Alan Cranston and State Senator Alfred Alquist (SB 1216 and SB 1340).



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Workshop Title: Old Myths & New Theories

Workshop Panelists: Dr. Ian Campbell
Retired State Geologist
Chief, Division of Mines & Geology
San Francisco

Dr. Richard H. Jahns
Dean
School of Earth Sciences, Stanford University
Commissioner, Seismic Safety Commission

This workshop dealt with the ancient myths and the current theories about the causes and the effects of earthquakes.

Ian Campbell began by relating some myths surrounding earthquakes, including the ancient belief that animals support the earth and the religious doctrine that earthquakes are punishment for sin. He mentioned that many less obvious myths continue to persist.

Richard Jahns then described some of the most current theories of earthquake causes and effects, including plate tectonics, surface faulting, and liquefaction. He also summarized the current status of earthquake prediction and control.

The workshop attendees expressed a concern for the following problems:

1. The public persists in believing old myths, such as the breaking off of the continental shelf to allow California to slide into the sea.

2. There is a lack of good data on locations of potential surface faulting.

3. The conservative approach to evaluating hazards does not emphasize areas of greatest risk.

4. Scientists are likely to be able to predict earthquakes before a response system is developed.

5. Dams built on or near faults may be subject to failure.

Those present were especially concerned about the lack of funding for research and public education.

Workshop Title: What Have We Learned From Recent Quakes?

Workshop Panelist: Dr. Gordon B. Oakeshott
Geologist
Oakland

This workshop dealt with the knowledge on the causes and the effects of earthquakes gained from recent seismic events.

This knowledge can be divided into the areas of (1) geology and seismology, (2) structural engineering, and (3) socio-economics. He described the relationship between earthquakes and faults. Fault movement is the result of the earth's crust being strained and eventually rupturing. The magnitude of an earthquake is proportional to the length of the fault that moves. The duration of the earthquake may cause more damage than the magnitude. Magnitude is a logarithmic measure of the energy released, while intensity is a measure of the effects of the earthquake at a particular area.

Workshop attendees were concerned about the ability of scientists to predict the probability of an earthquake occurring along a fault in the Bay Area. Dr. Oakeshott stressed that scientists are still far from being able to predict when, where, and how large the next earthquake in the Bay Area will be.

Workshop Title: Earthquake Prediction-Intensity

Workshop Panelist: Dr. Roger Borcherdt
Geophysicist
U.S. Geological Survey
Menlo Park

This workshop dealt with earthquake ground shaking and the resulting damage.

Roger Borcherdt stated that earthquake hazards are either geologic, including fault rupture, liquefaction, and ground shaking; or man-made, including the structural failure of buildings, dams, and overpasses. The most widespread damage from an earthquake is generally a direct result of ground shaking. The underlying geologic materials can change the characteristics of this shaking. For example, the intensity of shaking can be amplified in areas underlain by loose, unconsolidated materials. Much development in the Bay Area is located on this type of material. The earthquake in the San Francisco Bay Area in 1906 revealed that intensities varied between geologic units. The most violent effects were observed on the muds bordering the Bay and on the thick alluvial deposits beneath San Jose and Santa Rosa. This relationship was also reflected in the damages resulting from the earthquakes in Los Angeles, Alaska, and Managua.

Those attending the workshop had the following concerns:

1. Funding is needed to delineate earthquake hazard zones and to help local governments delineate potential hazards.

2. Controls are needed to prevent man-made hazards such as building collapse, dam failure, and loss of water supply. Zonation was mentioned as a means of controlling the location of structures.

3. Inadequate monitoring of the San Andreas fault is occurring due to lack of funding.

Workshop Title: The Implications of Earthquake Forecasting for Local Governments

Workshop Panelists:

Robert A. Olson
Executive Director
California Seismic Safety Commission
Sacramento

Leo Weisbecker
Project Leader
Earthquake Prediction and Technology Assessment
Stanford Research Institute

This workshop dealt with both the difficulties and the opportunities of accurately forecasting earthquakes.

The two panelists began by talking about the difficulty of accurately forecasting earthquakes. Unlike other scientific research, the laboratory is shared with the public making controlled experimentation impossible. If local governments accepted forecasting, programs could be developed for hazard reduction, readying emergency services, and controlling any disruptive consequences of the predictions themselves. However, there are constraints which might prevent local governments from reacting to forecasts, including a lack of funding, political pressure, a lack of success, their liability, and the cost of reacting to forecasts (e.g., closing up stores, schools, etc.).

Forecasting has a problem of credibility. China can make earthquake predictions, in spite of the failures, because the people there are more willing to accept the implications of failures. Even when the United States has perfected its ability to predict earthquakes, there will still be some failures. People need to accept this uncertainty.

The workshop attendees perceived the following needs:

1. More interdisciplinary studies, including both planning and science, are needed to predict the behavior of buildings, soil, and people during an earthquake.

2. A set of alternative earthquake mitigation techniques need to be developed and evaluated for use by local governments.

Workshop Title: The Liabilities of Local Governments

Workshop Panelists: Dr. Ira Michael Heyman
Vice Chancellor
University of California, Berkeley

John Flitner
Attorney
Santa Rosa

The main issue discussed in this workshop was government liability in the event of a disaster.

Michael Heyman noted that there is very little case law on this issue, and therefore few precedents. John Flitner, city attorney for Santa Rosa during its recent earthquake, then gave a brief account of the actual event and its aftermath.

The panelists agreed that governments are being seen as increasingly liable in the event of a disaster, despite a traditional assumption of governmental immunity. The concept in English common law that "the King can do no wrong" has evolved in California courts to one which increasingly sees government as vulnerable in cases where prior knowledge of hazards or disasters might have been available.

The problem now is that governments that take the time, effort and expense to investigate the possibility of hazards actually become more liable in the event a disaster occurs than a government (or institution) which had made no effort at all, and could hence claim ignorance of the hazard. Generalized maps will not make a city liable, but structural engineering guidelines will.

The panelsists viewed the following as major needs:

1. Better initial studies should be made of hazards.

2. The government's planned response should be approved by a legislative body.

3. Signs should be posted in dangerous buildings and areas.

4. More uniform standards for requiring local studies are needed so that ignorance cannot be an excuse from liability.

5. A better notion of jurisdictional responsibility is needed.

6. A specific plan for code enforcement should be undertaken.

Workshop Title: People, Predictions, and Perceptions

Workshop Panelist: Dr. J. Eugene Haas
Program Director
Institute of Behavioral Sciences
University of Colorado

This workshop centered around Eugene Haas's description of a study of organizational reaction to earthquake predictions that he is conducting.

His work involves surveys of business, government and media organizations to determine their responses to two imaginary earthquake prediction scenarios. Work completed thus far has centered on the likelihood that a prediction will be believed and acted upon by public and private organizations. The factors contributing to the believability of predictions can be summarized under the broad headings of credibility, confirmation, certainty, and intensity of threat.

According to Dr. Haas, the basic problems arising from a credible prediction are essentially economic in nature. Modeling completed thus far indicates that a credible prediction announcement would be followed by an end of new earthquake insurance underwriting in the affected area and reductions in property values, in real estate transactions, in mortgage availability, and in new construction. Unemployment would increase, sales and property tax revenues would decrease, and local non-essential services would be curtailed. Population reductions through out-migration might take place.

Evidence for these conclusions is available from Dr. Haas's present survey in California, from work he has done in Japan, and from a small study in Wilmington, North Carolina.

Workshop Title: Earthquake Hazards Evaluation

Workshop Panelists:

Dr. Robert Wallace
Chief Scientist
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Edward A. Danehy
Engineering Geologist
San Jose

William J. Kockelman
Environmental Planner
San Francisco Bay Region Study
U.S. Geological Survey, Menlo Park

This workshop dealt with earthquake hazards evaluation from the viewpoints of a geologist, an engineering geologist, and an environmental planner.

Robert Wallace began by defining the different types of hazards associated with earthquakes - ground shaking, ground failure, surface rupture, and uplift/downwarp. William Kockelman then described the information available on these hazards for planning through the U.S. Geological Survey and the ways the information is being used by cities and counties. Edward Danehy discussed the importance of buildings being built as designed, of defining acceptable risk, and of using technical information early in the construction process.

The workshop attendees were concerned about the following issues:

1. Property lines may need to be revised after fault movement has modified the land.

2. The political and economic implications of released geologic information can cause traumatic reactions. However, such reactions should disappear with time.

3. Risk maps at a generalized scale may not be useful for specific sites. However, such general maps can be used to decide where more information is needed.

Those present were especially concerned about existing hazardous schools, hospitals, and other critical structures. They saw a need to establish a formal review process for such structures.

Workshop Title: Earthquake Engineering

Workshop Panelists: Dr. John A. Blume
President
URS/John A. Blume & Associates
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Henry J. Degenkolb
President
H.J. Degenkolb and Associates
San Francisco
Commissioner, Seismic Safety
Commission

This workshop dealt with the relationships between engineering design and the property damage, loss of life, and social disruption caused by earthquakes.

John Blume defined several terms which relate to earthquake engineering. These included magnitude, intensity, acceleration, and duration. In general, earthquakes are much stronger than they have been given credit for but structures can also often withstand more earthquake activity than expected.

Henry Degenkolb then talked about the serious problems of parapets on buildings. The importance of protecting the contents of buildings was also discussed.

The following points were stressed by workshop attendees:

1. Important structures such as hospitals, should be designed to remain operational in spite of earthquake damage. The mechanical and electrical systems, as well as the structure itself, should be able to withstand shaking.

2. The public should support research and studies to deal with such design problems.

3. Response systems such as fire protection need to be improved.

4. All existing hospitals should be upgraded to improve safety in case of earthquakes.

In general, this workshop stressed the fact that buildings, utilities and systems can be designed to withstand a major earthquake if the public is willing to pay.

Workshop Title: What Goes Where?

Workshop Panelists: George D. Mader, AIP
William Spangle & Associates
Portola Valley
Commissioner, Seismic Safety Commission

Eleanor Young
Senior Planner, Santa Clara County

Charles Zahn
Senior Planner, Contra Costa County

John Bush
Assistant Planner, City of Hayward

This workshop was concerned mainly with four areas. John Bush discussed the City of Hayward's response to the location of a fault which runs through the city; Mr. Mader spoke on seismic problems in suburban areas; Mr. Zahn represented the County position; and Ms. Young spoke on Santa Clara County's seismic safety element. Each panelist discussed his/her respective jurisdiction's response to three variables: 1) hazards (type, severity and data accuracy); 2) land use (occupancy, density and structural type); and 3) risk. The differences in jurisdiction size, character, and type determined the intensity and scope with which they viewed the problems.

Major seismic hazards were discussed. These included landslides and fault creep, dam failure, flooding and building failure. Both the panelists and workshop attendees were concerned with the lack of information on dam inundation and failure; critical utilities and their ability to withstand seismic damage; and length of time required to pass ordinances on earthquake preparedness.

Workshop attendees and panelists were especially concerned with the following points:

1. More earth science data is needed in order to accurately map hazards.

2. The Public Utilities Commission should require gas, electric and water companies to make an evaluation of the seismic resistance of their existing and proposed facilities. These evaluations should be reported to appropriate jurisdictions; and

3. Residential data reports should be required for all land transfers.

Workshop Title: Earthquakes & Money: Insurance & Other Sorrows

Workshop Panelists: W. Victor Slevin
Vice President
American Insurance Association
San Francisco

Dr. J. Eugene Haas
Program Director
Institute of Behavioral Sciences
University of Colorado

This workshop dealt with two aspects of insurance and earthquakes. The first was existing insurance possibilities and the second was the interrelationship of future earthquake prediction and needs for insurance.

Mr. Slevin stated that earthquake insurance is currently available at an annual cost of approximately $100 for a $50,000 home. Although few people presently choose to buy such insurance, the insurance industry opposes any program which would force people to do so. The industry feels that it could not cover large earthquake losses.

Mr. Haas gave an introduction to earthquake prediction and possible economic effects. He stated that prediction might weaken the economy in areas with high earthquake possibility. Without insurance, earthquake prediction in such situations could result in fiscal collapse of local governments.

Haas saw insurance as one possible solution to such fiscal problems. However, Slevin has said that a mandated program could work only if the Federal Government would act as a reinsurer (i.e., insure the industry against a situation where earthquake claims exceed ability to pay).

Workshop Title: The Parapet and the Pedestrian (Ordinances & Codes)

Workshop Panelists: Dr. Henry Lagorio
Professor of Architecture
University of California, Berkeley
Division of Environmental Research & Technology
Commissioner, Seismic Safety Commission

J. Fred Silva
Consultant
Senate Local Government Committee
Sacramento

This workshop dealt with building design as it relates to earthquake hazard. Dr. Lagorio introduced three key aspects of building design that may cause hazards in earthquakes. These included: 1) structural elements (building framework); 2) architectural elements such as walls and decoration; and 3) mechanical and electrical equipment. In the event of an earthquake, each one of these aspects has implications for safety and property damage.

Mr. Silva introduced policies and implementation procedures to deal with these design problems. To determine policy, each local government needs to define the type of hazards or risks particular to the area and the acceptable level of risk a community will bear. Implementation techniques can take the form of codes for both rehabilitation of older and unsafe structures and new construction.

The main points which both the attendees and panelists agreed upon were the following:

1. The costs of rehabilitating unsafe structures are very high. In addition, rehabilitation can often cause loss of historic value. Therefore, there should be an identification of what is considered safe and a determination of guidelines for rehabilitation.

2. There is a need for legislation requiring such rehabilitation. It was suggested that ABAG formulate guidelines for State legislation requiring improvement of older or unsafe buildings and implementation of safety standards.

3. Many local seismic safety elements need improvement. The State should develop guidelines to judge their adequacy. Penalties or incentives could be developed to encourage localities to complete adequate seismic safety elements by a specific deadline.

Workshop Title: How Utilities Can Survive

Workshop Panelists: Richard Bettinger
Chief Civil Engineer
Pacific Gas and Electric Company
San Francisco

Helen Burke
Director
East Bay Municipal Utility District (EBMUD)
Oakland

This workshop dealt with the effects of earthquakes on utilities. Helen Burke discussed EBMUD's survey of its existing systems and facilities. This was used to determine the impact of earthquakes and as a basis for developing preparedness plans. EBMUD's preparedness plan has four parts: 1) the organization for rapid recovery, restoration of services, and mutual aid agreements; 2) advanced preparations to ensure water supply for drinking and fire fighting; 3) improved data base and design standards; and 4) evaluation of the seismic adequacy of existing facilities.

Richard Bettinger then discussed PG&E's efforts to expand facilities and make advanced preparations for earthquakes. Both Ms. Burke and Mr. Bettinger felt their respective agencies could deal with emergencies and aid others.

Workshop attendees were interested in specific utilities problems associated with the San Francisco earthquake of 1906 and the San Fernando earthquake of 1971. Steps taken to improve these systems were discussed. San Francisco has developed a salt water system to serve as backup for fire fighting. However, little was known about preparedness in smaller utility districts, particularly in the north Bay counties.

The following consensuses resulted from workshop discussion:

1. There is a need for coordination of planning for restoration of sewage collection facilities with plans for water and power supply.

2. County emergency services plans should be coordinated to ensure that there are no loose ends. This could possibly be done by ABAG if it is not being done by the State Office of Emergency Services.

3. Coordination should include establishment of priorities to be followed in case of an earthquake. For example, roads should be opened first since construction equipment, and emergency vehicles (ambulances, fire trucks, water supply tank trucks) require adequate access.

Workshop Title: The Emergency Response System: A Case of Underkill?

Workshop Panelists:

Loren Fields
Planning Officer
California Office of Emergency Services
Sacramento

William W. Ward
Regional Manager
California Office of Emergency Services
Concord

Cecil C. Byrd
Senior Planner
California Office of Emergency Services
Concord

Cecil Byrd introduced the session by identifying the major areas of weakness in earthquake planning and response systems. These included the following: 1) emergency medical response systems cannot adequately transport personnel to the field and victims to facilities; 2) communications capabilities are inadequate; 3) care for displaced persons is not adequately organized; 4) food, shelter and first aid resources need improvement; 5) the existing rescue capability is not sufficient.

The following points were identified as major concerns:

1. Communications is the major problem. Existing systems are land-based and back-up is necessary. Mobilization of existing systems, such as a ham radio operator, was seen as a mechanism for developing such back-up. In addition, interjurisdictional systems (i.e., city to county and county to region) are also necessary. Computer hardware will be a requirement for implementation of such systems. The major obstacle at this time is funding sources for the purchase of the hardware.

2. The State should inspect health care facilities to coordinate with the Office of Emergency Services' response plan. They should also look at hospital licensing requirements for disaster.

Workshop Title: The Costs of Getting Ready

Workshop Panelists:

Dr. Stanley Scott
Assistant Director
Institute of Governmental Studies
University of California, Berkeley

Frank E. McClure
University Engineer
University of California
Berkeley
McClure & Messinger
Oakland
Commissioner, Seismic Safety Commission

This workshop dealt with the costs of getting ready for an earthquake. The main problems involve the improvement of manmade structures. In spite of the abundance of knowledge on adequate precautions, standards have not been met. It was suggested that the costs of not getting ready are as important an issue as the costs of getting ready. Compared to other disaster costs, the earthquake has been ignored.

The main problem areas discussed by workshop attendees included: (1) the need for publicity and getting the public involved in issues related to earthquake preparation; (2) the fact that public officials are not presently involved in seismic safety issues; (3) public apathy about seismic problems; (4) a lack of broader and more consistent standards for public safety.

The workshop participants came to the following general agreements:

1. Steps should be taken to plan for sensible urban development in the future. This should include land use planning, avoiding high impact areas, and studying the geology of sites specifically being developed. Every significant structure must be built to withstand a major earthquake.

2. Wherever possible, existing structures should be prepared for earthquakes. Safety can often be achieved with little additional cost. One must carefully examine the additional cost of providing certain precaustions compared with its actual benefit.

3. The importance of earthquake safety preparation must be closely compared to all other natural disasters. It may be found that other hazards are of greater concern than earthquakes and might require more immediate attention.

4. Public officials are presently not sufficiently serious about funding solutions for earthquake hazards. This is partly because the problem of liabilities is overwhelming to most local officials and other social concerns may be more pressing.

Workshop Title: Film and Discussion - "Our Active Earth"

Workshop Panelists: Patrick Griffin
Vice Mayor
City of Albany
Albany, CA

This workshop dealt with ways of reducing earthquake hazards.

Earthquake hazards can be reduced by constructing safer buildings, by increasing the public's understanding of earthquakes, and by predicting or controlling earthquakes.

During an earthquake, people should try to get away from glass, stand under arches, stay away from fireplaces, not burn candles, turn off electricity and gas, have a portable radio and flashlight and sit under a table. People in highrises should get near support columns, away from glass, and under a table or desk. After the earthquake, they should walk quietly down the stairs and stay away from any damaged areas in the structure.

The workshop attendees thought that local governments should make citizens aware of potential earthquake problems ahead of time so that these people would be able to take care of themselves. Individuals should have fresh batteries, dehydrated or canned goods, and drinking water set aside for an emergency. The local government should coordinate with churches, organizations for the handicapped, neighborhood associations, and newspapers to make citizens aware of the problems and appropriate preparedness activities.

Workshop Title: The Implications of Earthquake Prediction

Workshop Panelist: Professor William Anderson
Sociology Department
Arizona State University

This workshop dealt with the implications of earthquake prediction for public policy.

Approximately 70 million people in the United States are exposed to earthquake hazards.

Prediction of earthquakes and notification of the people exposed to the earthquakes requires that the location, magnitude, and time of the earthquake be specified. The major concern is with major earthquakes of magnitudes greater than 5. For the largest earthquakes, seismologists can detect precursory environmental signs several years before the event itself, giving the public warning at that time.

The response of local governments depends on the amount of warning received. If the prediction is several years before the event, responses may include land use planning, structural design and maintenance programs, storage of hazardous materials, reduction of the water level in dams, preparation of emergency services, and evacuation of hazardous areas and buildings.

Long term predictions also allow more possibility of counterproductive responses, including not underwriting new insurance policies and not issuing new building loans.

The workshop attendees were concerned about the credibility of the predictions, including the potential for false alarms and inconsistent predictions coming from different sources. They saw a possible governmental role for "certifying" predictions.

Workshop Title: What Should a Seismic Safety Plan Do?

Workshop Panelists: William Press, Deputy Director
and Larry Mentier
California Office of Planning and Research
Sacramento

The workshop emphasized the implementation of Seismic Safety Elements. The attendees also discussed how local governments should relate their seismic safety elements to the other elements of their general plan.

The stated objective of the Seismic Safety Element in the General Plan Guidelines of the California Council of Intergovernmental Relations is "to reduce loss of life, injuries, damage to property, and economic and social dislocations resulting from future earthquakes." Seismic Safety Elements should provide decision makers with better information and should outline an implementation program that will be carried out by the local government.

The following approaches have been taken by various localities to implement their Seismic Safety Elements:

1. Modify land use and development regulations.

2. Require structural review and abatement.

3. Update the disaster preparedness plan.

4. Collect and disseminate information.

5. Keep abreast of new building codes and construction for possible inclusion into the local code.

The workshop attendees were concerned about what to do after a hazardous area is delineated. Suggestions were to down-zone, apply inverse condemnation or transfer the development rights of hazardous areas and to apply the findings of the ABAG land capability study to determine the cost of developing hazardous areas.

Workshop Title: The Status of Earthquake Prediction and Public Warnings

Workshop Panelist: Dr. Peter L. Ward
Chief
Branch of Seismology
U.S. Geological Survey
Menlo Park

The workshop dealt with the question of when a quake prediction system will be operational, the reliability of such a system, and the implications of prediction for planning. The most effective indicator to date is the tilt meter.

Peter Ward began by stressing that a system for predicting earthquakes will be developed. He could not say when it would be operational and how reliable it would be. He also talked about the implications of predictions for planning, including changing land use patterns. Public warnings will not result in mass hysteria, but in a mass denial of an impending earthquake. The public in this country has a very low tolerance for error in predictions, even though weather predictions are accepted. Weather predictions are less critical economically and less threatening than earthquake predictions.

The workshop attendees were concerned about the following issues:

1. Prediction needs to be coupled with planning. Prediction is mainly for saving lives. Planning, zoning, and building codes can save lives and also minimize damage.

2. Prediction should focus on anticipation of the effects of earthquakes as well as the location, size, and time of earthquakes.

3. A method is needed for conveying predictions to the public and for determining what action should be taken.

Workshop Title: Can Our Emergency Systems Respond?

Workshop Panelist: Charles Manfred
Director
California Office of Emergency Services
Sacramento

This workshop dealt with the ability of emergency services to respond when needed.

Charles Manfred explained the process of response to earthquakes, with mutual aid agreements as the foundation of the response system. He described the strengths of the State Emergency Plan and the functions of the California Office of Emergency Services.

The following needs were mentioned by workshop attendees:

1. The roles and responsibilities of the elected officials, staffs, and others at the local level need to be clarified.

2. Governments need to participate in drills to prepare the community and the emergency staff for effectively using the disaster plan.

Workshop Title: Rebuilding After the Next One

Workshop Panelist: Arthur Keene
County of Los Angeles

This workshop dealt with the rebuilding that occurs after a major earthquake.

As a Los Angeles County geologist, Arthur Keene was involved in the 1971 San Fernando earthquake and the subsequent rebuilding projects. Two buildings, Olive View Hospital and the juvenile hall, were severely damaged during the earthquake. Mr. Keene discussed the cause of these two building failures and the rebuilding of them that is now occurring.

Olive View Hospital was dedicated two weeks before the 1971 earthquake. The same site now is being utilized for rebuilding the hospital. The main reason for the failure was the unanticipated intensity and acceleration of the earthquake. Rebuilding on the same site was an economic necessity; the Federal government would grant funds for rebuilding expenses only, not for purchase of property. Extensive geologic studies were made and the result of them were incorporated into the new architectural design.

The juvenile hall was damaged by landslides that were triggered by the earthquake. A sand layer saturated with ground water caused liquefaction to occur. Again, economic reasons caused rebuilding on the same site.

Both of these areas were controlled by minimal code ordinances. Neither area was known to have seismic or ground failure potential. Since the earthquake, there have been changes in the codes. However, only slight improvements in those codes governing critical facilities have been made. Currently there is a standoff between scientific knowledge and political power.

The workshop attendees stressed that counties, cities, and other jurisdictions should pass ordinances and provide staff to delineate potentially hazardous areas and to determine where detailed geologic studies should precede the issuance of building permits.

Workshop Title: The Greening of Earthquakes$: Mortgages, Insurance, Jobs

CANCELLED

Workshop Title: Getting To First B.A.S.E. *

Workshop Panelists: Vince Conners, Regional Field Specialist
Defense Civil Preparedness Agency,
Region 7
Santa Rosa

Cecil Byrd
State of California Office of
Emergency Services, Region 2
Concord

Daniele Hurley
Golden Gate University
San Francisco

This workshop dealt with the reports and studies prepared for each of the Bay Area counties by the Defense Civil Preparedness Agency.

The Defense Civil Preparedness Agency is equipped to hold workshops and comparable programs for interested groups and local governments.

The public officials present were concerned because they had not been successful in convincing their constituents that a problem exists. Many local governments are not sufficiently interested in hazards planning and implementation to pursue the necessary steps. The predominate attitude among many local officials is that only large cities, such as San Francisco, need to prepare for earthquakes.

Those present were concerned that local governments and citizens groups seem to lack the enthusiasm to utilize the available information. They felt that the Civil Preparedness workshops would be helpful to inform the public of all possible steps that can be taken to guarantee some useful level of safety.

*B.A.S.E. is the Bay Area Systems Exercise--a county by county test of emergency response services' capabilities being done in 1976.

Workshop Title: Local Governments' Liability in Disasters

Workshop Panelist: John Larsen
Los Angeles County Counsel

This workshop dealt with the liability of local governments for disasters. John Larsen, Los Angeles County Counsel, noted that the County had lost many liability cases in recent years, and suggested, therefore, that governments are increasingly liable in citizen and class action suits in the event of a natural disaster. He admitted, however, that there is still not sufficient case law to establish firm precedents. In the absence of clear indications of responsibility, the courts may determine liability and/or compensation obligations by the ability of the various parties to pay.

Those at the workshop mentioned the following needs:

1. Cities and counties should be required to adopt emergency procedures.

2. Detailed requirements are needed for Seismic Safety Elements.

3. Better planning, with conditions for radio communications and helicopter services, is needed for disaster response.

4. Planners should be more aware of existing laws at the State and Federal levels.

Workshop Title: Who's in Charge After the Quake?

Workshop Panelist: Frank Manda
Deputy Regional Director
Federal Disaster Assistance Administration
Region 9
San Francisco

This workshop dealt largely with the Disaster Relief Act of 1974 (PL 93-288).

The Federal Disaster Assistance Administration, as part of the U.S. Department of Housing and Urban Development, is responsible for administering the Disaster Relief Act. This Act provides Federal funds or technical assistance to supplement State and local disaster relief funds after an emergency is declared by the State and local governments. The Federal agency works through the State to the local governments. A joint Federal-State "one-stop" individual assistance center can be set up close to the disaster scene where representatives from all of the Federal and State agencies involved can provide help to individuals.

The same people are in charge after the earthquake as were in charge before. Public officials should be visible after a disaster strike, but someone still must be in charge and manage the response effort. Local emergency plans should address this situation.

The workshop attendees were concerned about the following issues:

1. The Disaster Relief Act states that if insurance is available for the type of disaster, it must be purchased before relief funds can be given to an individual. However, "available" has not been clearly defined in this Act.

2. This Act can abate the hazards associated with an imminent disaster. "Imminent" has not been defined to deal with predicted earthquakes.

3. All expenditures under this Act are subject to State and Federal audit. Since uniform standards do not exist, individuals and public agencies can be denied some or all of the funds they thought that they might receive. These people and agencies should work closely with the State Office of Emergency Services in developing plans and preparing claims.

Those attending this workshop felt that local and State emergency plans should be prepared to make full use of the Act. The Federal and State agencies and local governments also should maintain liaisons so that, after a disaster, those in command will know the procedure for obtaining Federal relief.

Workshop Title: What Can Local Governments Encourage Property Owners To Do?

Workshop Panelist: Peter Yanev, Author
Peace of Mind in Earthquake Country
URS/John A. Blume & Associates
San Francisco

This workshop dealt with those actions that can be taken by homeowners to increase the safety of their homes.

Peter Yanev's opening remarks focused on what will happen to the individual in an earthquake. The person's concerns are his home, its construction, and potential property damage. A slide presentation illustrated damage to different types of home construction during an earthquake, unsafe aspects of older homes, and simple structural solutions to many of these potential problems. This presentation triggered discussion about individual homeowner's problems and questions about ways to recognize and to improve unsafe structural conditions. Participants expressed concern about the costs of such improvements. Peter Yanev felt that often solutions are simple and relatively inexpensive. However, he said that a particular problem was educating people about these unsafe conditions. Although recent changes in building codes have improved the construction of new homes, Peter Yanev suggested that local governments could play a role in informing the public about earthquake hazards and educating property owners about problems in older homes, mitigation measures, costs of improvements, and insurance programs.

Workshop Title: What Should a Seismic Safety Plan Do?

Workshop Panelists: Moderator: Councilwoman Joyce A. Jackson
City of Albany

Don Woolfe
Planning Director
San Mateo County

F. Beach Leighton
President
F. Beach Leighton and Associates
La Habra

This workshop dealt with what Seismic Safety Elements have and have not accomplished.

Don Woolfe began the workshop by giving a slide presentation made as part of the San Mateo County Seismic Safety and Safety Element. The presentation dealt with the cause and effects of earthquakes as well as of other earth science concerns.

F. Beach Leighton then discussed what Seismic Safety Elements have and have not accomplished. They have identified hazards, increased public awareness of these hazards, and provided mechanisms for requiring site studies judging new development, improving building and safety codes, and preparing insurance programs and contingency plans. They are <u>not</u> site studies and are not usually applicable for zoning.

Joyce Jackson moderated the closing discussion.

The workshop attendees mentioned the following issues:

1. The knowledge and awareness of geologic hazards have occurred after much development has been completed. Code enforcement and public education were suggested as the most realistic ways of improving the safety of this existing development.

2. The geotechnical investigations are very expensive. It was suggested that requiring these studies before a lot split would be one way of decreasing these costs since investigations for large parcels are proportionally less expensive.

Workshop Title: Are Present Building Standards Adequate?

Workshop Panelists: Professor Emeritus
George Simonds
University of California, Berkeley

Victor Taugher
Alameda County

This workshop dealt with the adequacy and inadequacy of current building codes.

Victor Taugher presented a short history of the Uniform Building Code, emphasizing the specific code requirements for seismic safety. The Code prescribes the forces that a building should be designed to resist. It is inadequate in a number of ways; it has been reducing safety factors, increasing the allowable stresses for impact loading, neglecting requirements for conventional 1 and 2-story wood-frame structures, and ignoring vertical acceleration.

Professor Simonds cited several examples where the Uniform Building Code was adequate, but because of failures of the designer, builder, or operator of the building, safety factors were nullified. These examples included exit doors opening out in conformity with the UBC, but kept padlocked because of vandalism and self-closing fire doors designed to compartmentalize fires, but wedged open. Eternal vigilance is the price of safety. The Code is not enough. The staff of public facilities must be educated.

The following recommendations were mentioned by the workshop panelists:

1. ABAG, representing a community of policy makers, should keep the Legislature informed about the level of protection in the UBC. The Legislature, not the structural engineers, should determine the seismic code requirements. (The added cost of increasing the level of protection (2-10%) is not a significant factor.)

2. ABAG should advocate funding for basic research in designing buildings to be earthquake resistant.

3. Local governments should exercise vigilance to ensure that public buildings are designed to conform to building standards and are closely inspected during construction, and that staffs observe safety requirements in the operation of the buildings.

4. ABAG and local governments should insure that adequate fire and seismic standards are observed.

Workshop Title: Aiding The Injured

Workshop Panelists: Dr. Saleem Farag, Chief
Emergency Medical Services
Comprehensive Health Planning
State of California

William Kendall
Earthquake Response Planner
Emergency Medical Services
State Health Department

William J. McLarty, Head
Disaster Health Services
Emergency Medical Services Section
State Health Department

This workshop dealt with the problems and potential solutions surrounding anticipated earthquake injuries and deaths.

4:30 p.m. would be the worst time for injuries; 7,000 deaths and 28,000 serious injuries are estimated. Most hospitals in the Bay Area would be destroyed. Our current resources are not capable of dealing with such an emergency. There are only 300 physicians and 2,000 nurses trained in emergency care in the entire State. Fragmentation of services at the State, regional, and local levels is also a primary problem.

The workshop attendees saw the following needs:

1. Support of expanded and coordinated Emergency Medical Services training is needed because of the current lack of adequate personnel and resources.

2. Development and support of Regional Emergency Medical Services systems is need to end the fragmentation of services.

3. Public information and education for self help is needed.